



# The Fallacies of IP/Optical Convergence and a Case for Smart Coherent Pluggables

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# Question

What is from 1984 and has seven layers?









Ignorance is bliss



Ignorance **about layer 1** is bliss



Ignorance **about layer 3** is bliss

# IP-optical convergence complete solution

Networks with separate IP and optical layers are an unnecessary resource overhead. Management mechanisms, given performance target, need to be. Like many other solutions, they add cost and lowers the ability to

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## A Framework for IP-Optical Convergence Building from Existing

The communications landscape is changing. Market dynamics are changing enterprise cloud applications and data center connectivity cases and exciting revenue opportunities. Communications Service Providers (CSPs) are evaluating IP-Optical convergence from an IP networking perspective. New use cases are also creating new traffic patterns, the need for distributed applications, bandwidth and lower latency for end-users. Many networks are evaluating IP/Optical convergence as a key element of IP network modernization to meet emerging requirements for cost-efficient, resilient and unified networks. What are the key elements required to realize the benefits of IP/Optical convergence? There is no 'one size fits all' solution, as architecture evolution needs to start with the CSP's current network reality. While the

them as part of their...  
87 percent of providers...  
important or critical for their next...



Optical Networking /

## Pioneering Transport

Cisco Ro



# Tracking IP-over-DWDM Momentum as the Industry Turns Toward Convergence

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## Tracking IP-over-DWDM Momentum as the Industry Turns Toward Convergence

September 12, 2023  
by Moran Roth

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# The Rise of Coherent Pluggable Optics





# Performance in Ideal Circumstances



## 1,800KM – LIVE NETWORK

400G QSFP-DD

Spectrum shared with multiple vendors

400G 16QAM and SMF-28 fiber

\*Arelion

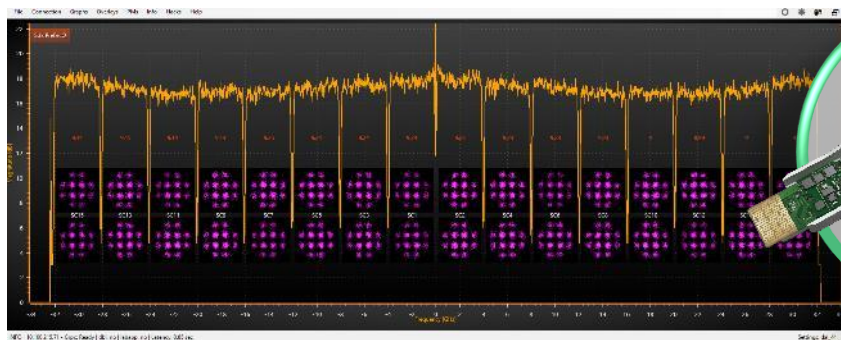


DALLAS



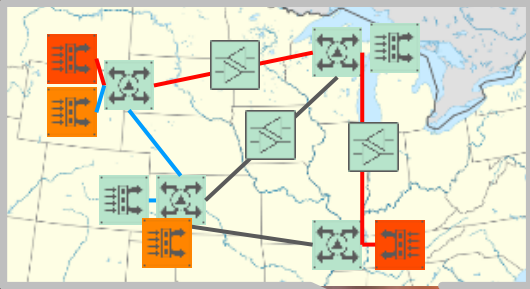
MEMPHIS

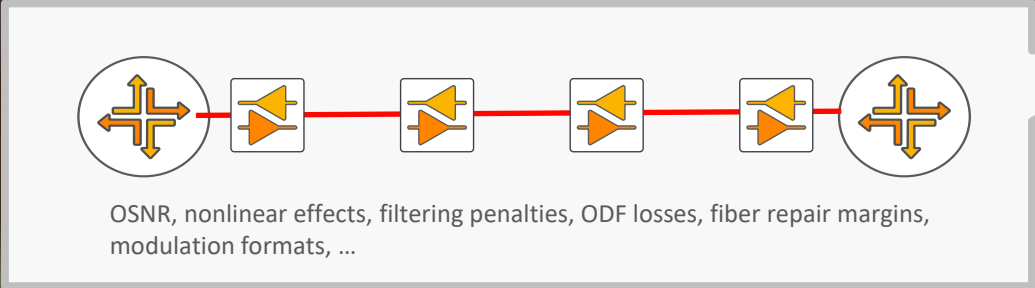
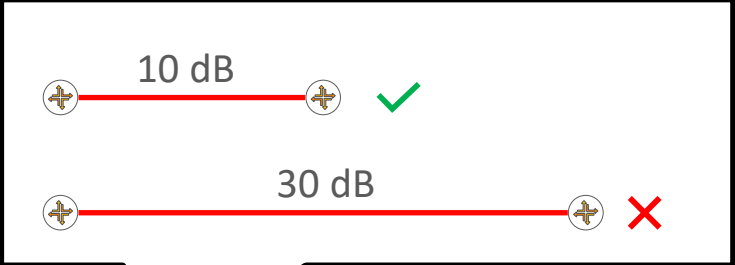
### ICE-X 400G ZR+



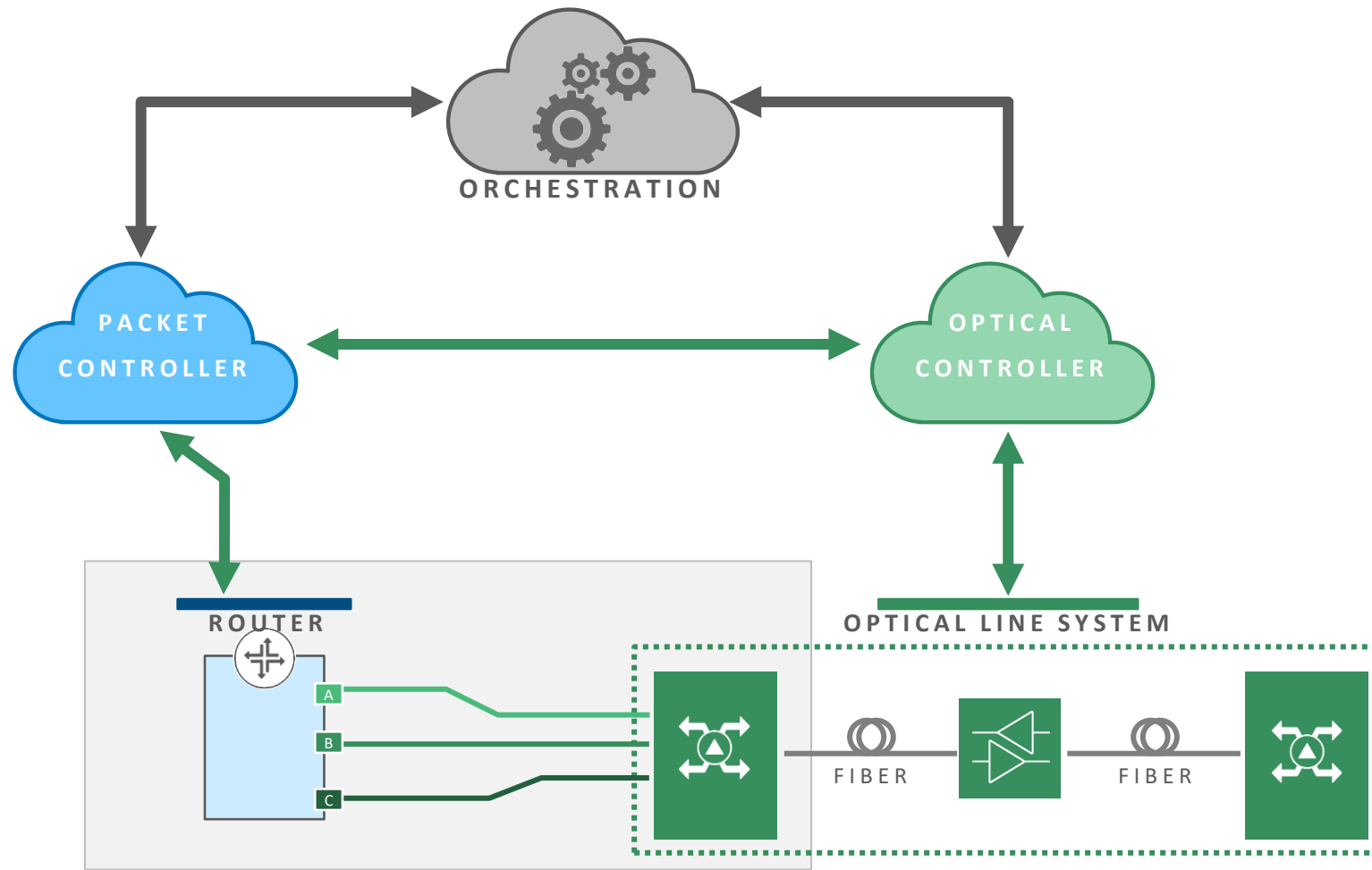


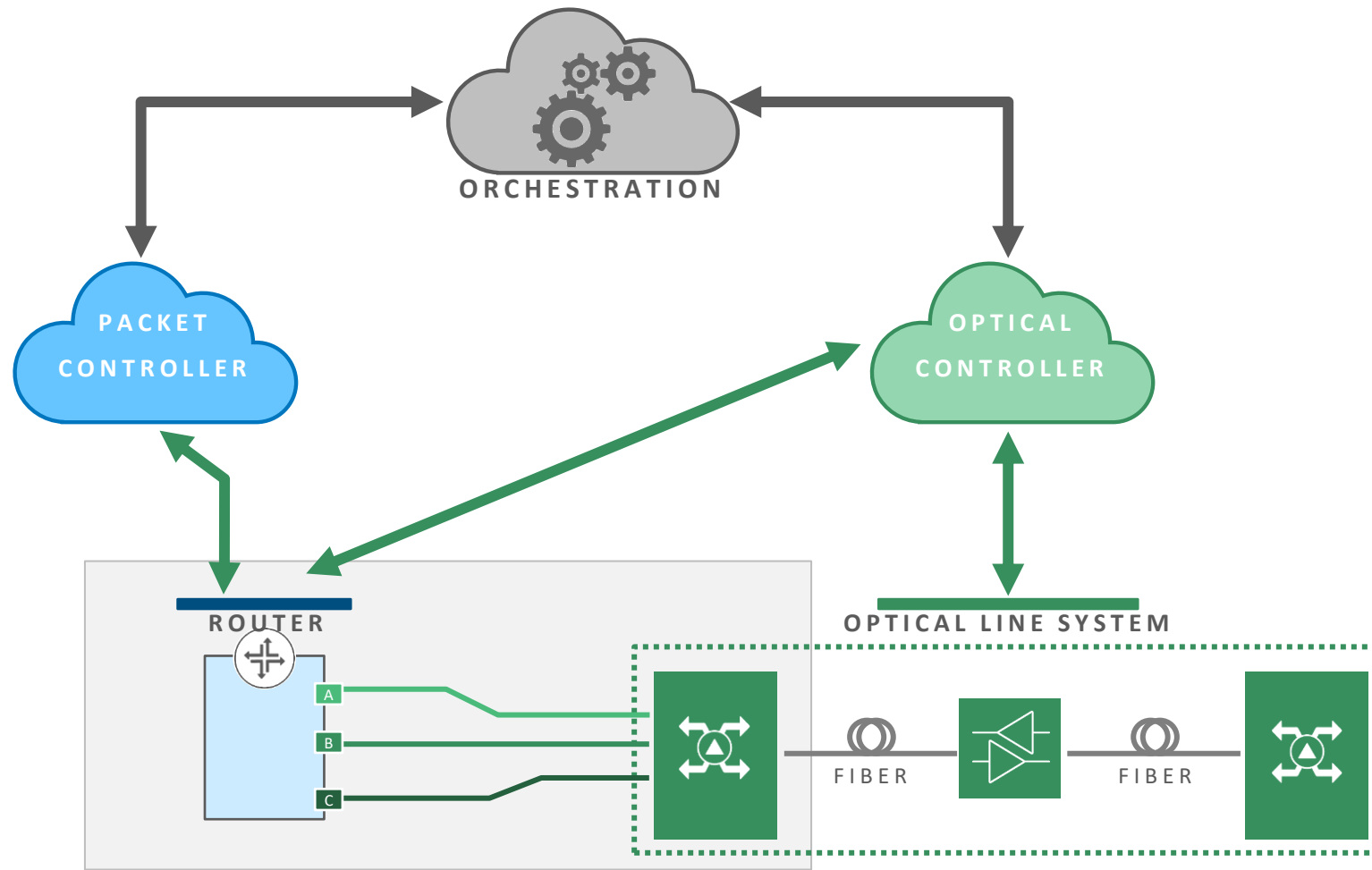
```
# connector breakout ?
breakout <keyword>
<keyword> - (c1-40g|c4-10g|c1-100g|c4-
25g|c10-10g|c1-400g|c2-100g|c4-100g|c1-
10g|c1-25g|c1-50g|c8-50g|c1-800g|c3-
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aui2|c2-100g-aui2)
```











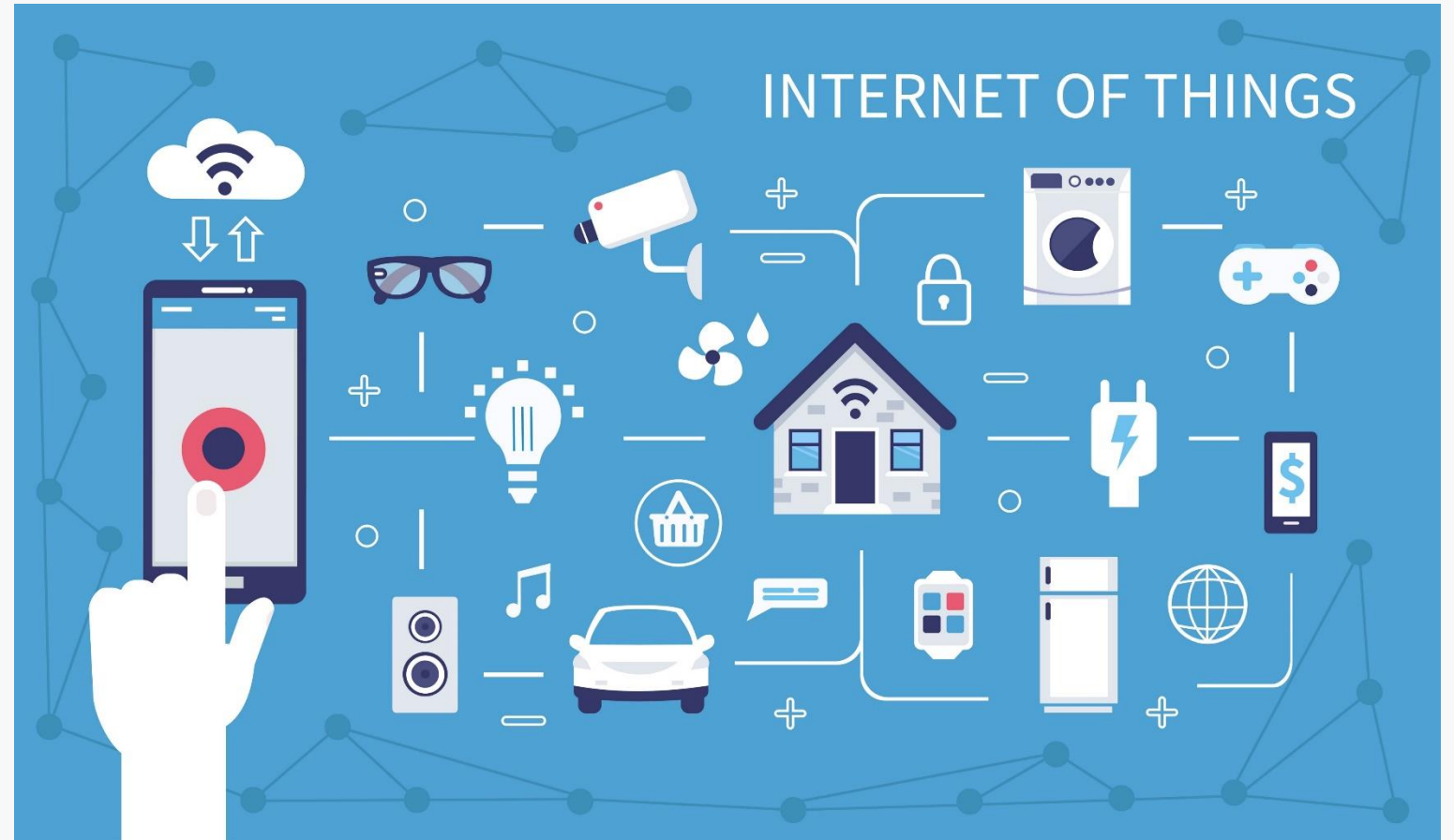
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# Taking Cues from Adjacent Markets I

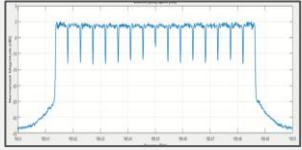




# Taking Cues from Adjacent Markets II



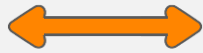
# Intelligent Coherent Pluggables



Subcarrier-based architecture

## DSP

✓ System on a Chip

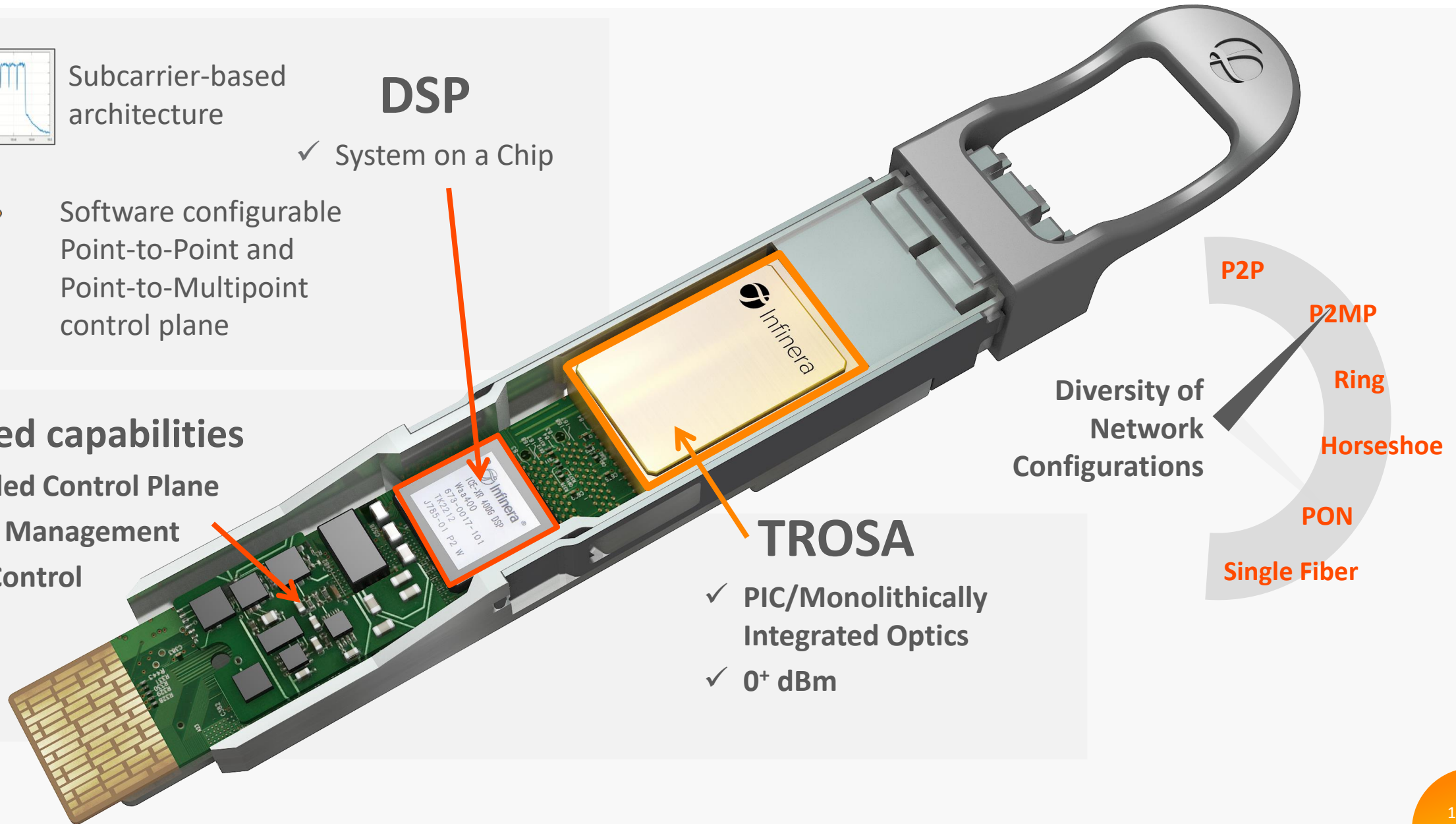


Software configurable  
Point-to-Point and  
Point-to-Multipoint  
control plane

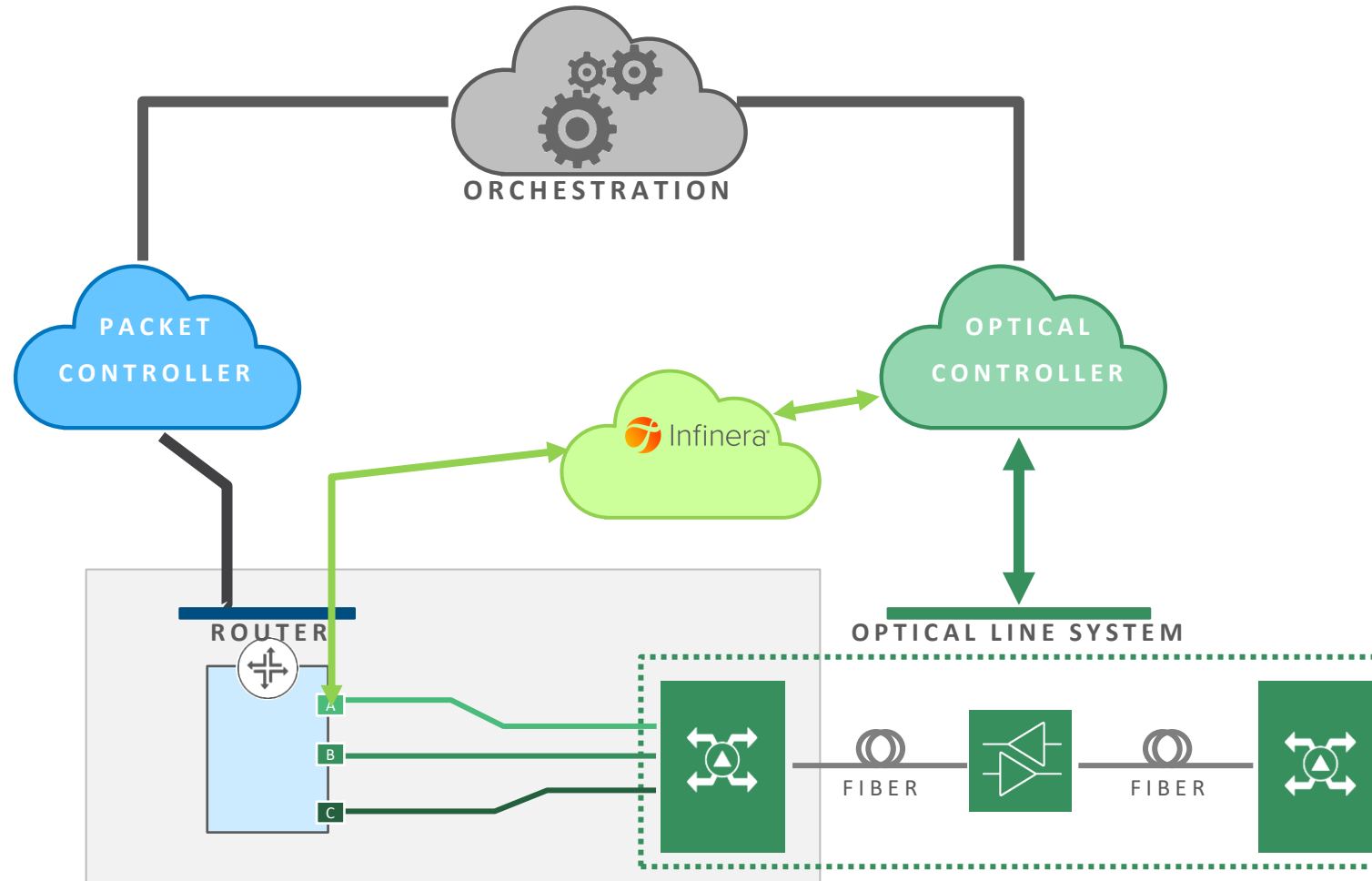


## Integrated capabilities

- ✓ Embedded Control Plane
- ✓ Remote Management
- ✓ Power Control
- ✓ OSA

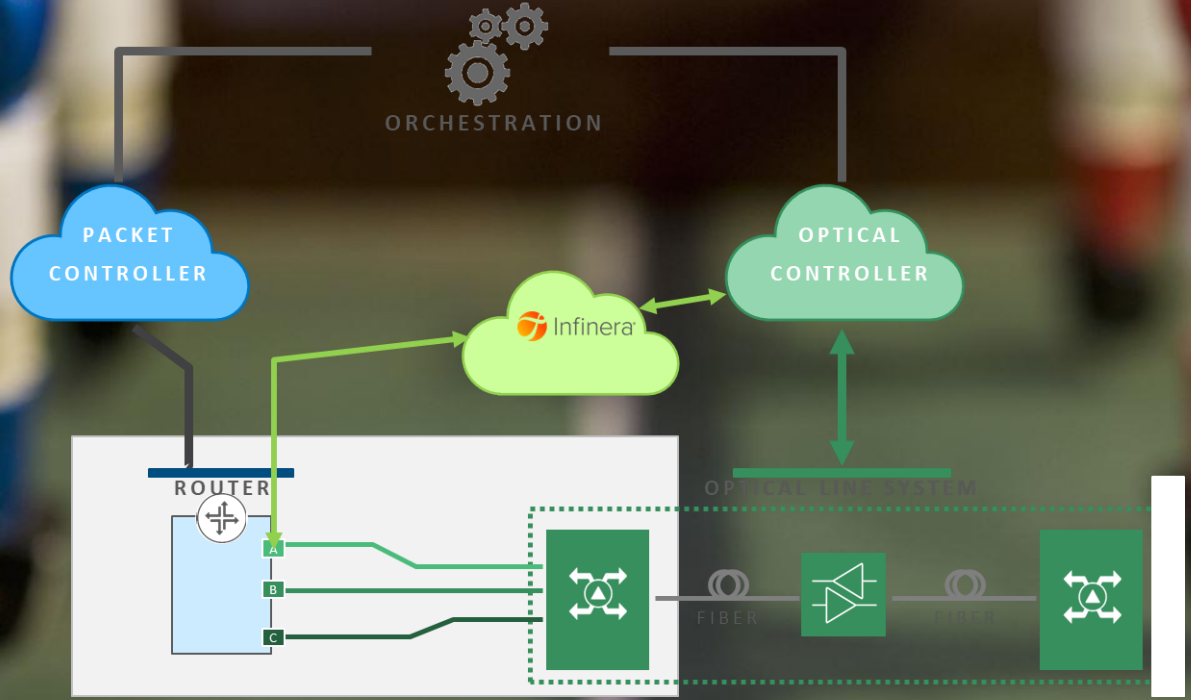
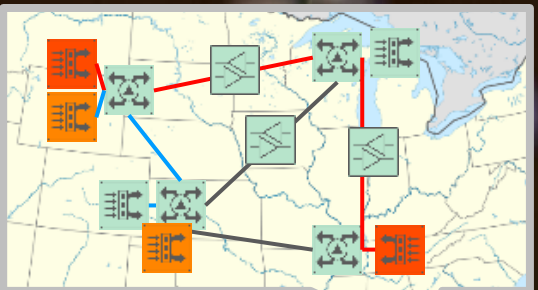


# Host-Independent IPoDWDM Management





```
# connector breakout ?
breakout <keyword>
<keyword> - (c1-40g|c4-10g|c1-100g|c4-
25g|c10-10g|c1-400g|c2-100g|c4-100g|c1-
10g|c1-25g|c1-50g|c8-50g|c1-800g|c3-
100g|c8-100g|c2-400g|c1-1g|c1-100g-
aii2|c2-100g-aii2)
```





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